Space Weather Forecast

Issued on Monday, 18 September 2023 at 01:23 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2 minor/moderate storm intervals expected during Tuesday 19th September however, with a likely CME (coronal mass ejection) arrival bringing a slight chance of a G3/Strong storm. Chance of isolated R1 Minor Radio Blackouts throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low over the past 24 hours. There are currently seven sunspot regions on the visible disc. The most active spot over the last few days remains near centre disk, but this region has continued to see weakening and fragmentation within its central portion, with a corresponding slight reduction in flare risk. A region in the northwest looks to be fading with an as yet unnumbered NEW region forming quickly to its southeast over the last 24hrs, this region will need monitoring and for now helps to maintain total flare risk. All other sunspot regions stable.

No new Earth-directed CMEs (coronal mass ejections) were observed in available imagery.

Solar Wind / Geomagnetic Activity: Solar winds were at slightly elevated levels to start, around 430km/s. From approximately 17/0200 UTC winds increased to 470-500km/s following the likely arrival of the CME associated with a flare on the 14th, subsequently they have been slowly declining. The IMF was steady and weak initially, but increased with the CME to become erratically moderate. The north-south component was also weak to start but became briefly moderately negative with the arrival of the CME, subsequently becoming predominantly positive. The net result of the above solar wind measures was for provisionally Quiet to Unsettled (Kp2-3) geomagnetic activity.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Generally Low activity expected, but there remains a chance of isolated Moderate Class flares throughout the period.

Solar Wind / Geomagnetic Activity: The geomagnetic forecast is of lower than average confidence with multiple potentially Earth directed CMEs.

A chance of G1 from a potential glancing CME later on day 1 (18 Sep).

However, the most significant event is likely the large filament (arc of plasma) eruption and associated CME which occurred early on the UTC day of 16 Sep, this has been analysed and modelled, which suggests a likely Earth directed component with an arrival time during Day 2 (19 Sep).

G1-G2/Minor-Moderate storm intervals expected during day 2 (19 Sep), with a Chance of a G3/strong storm due to the expected arrival of the large CME from the filament eruption on 16 Sep, potentially combined with fast solar wind influence. CME and fast wind effects perhaps lingering into day 3 (20 Sep) but likely waning somewhat by day 4 (21 Sep).

Energetic Particles / Solar Radiation: No solar radiation storms are expected, with a daily slight chance of an enhancement should any larger flares occur.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	80	60	30
Strong	G3	No	5	30	10	5
Severe	G4	No	1	2	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	30	30	30	30
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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